

**REMARKS**

**Status of claims**

Claims 1-3, 5 and 6 are pending, with claims 1 and 6 being independent. Claim 5 has been withdrawn. Applicants have amended claims 1 and 6 to correct informalities in the claim language and to more clearly define the claimed subject matter. Care has been taken to avoid introduction of new matter. In view of the foregoing amendments and the following remarks, Applicants respectfully submit that all pending claims are in condition for allowance.

**Claim Rejection - 35 U.S.C. § 103**

Claims 1-3 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Peters et al. (USP 3,332,765) in view of Anderlind et al. (USP 5,267,845). This rejection is traversed for at least the following reasons.

Claims 1 and 6 have been amended to recite *“small beads are used for forming an inner layer of the lens, and large beads are used for forming an outer layer of the lens.”* It is clear that the inner side of a Luneberg lens has a higher dielectric constant and the outer side of the Luneberg lens has a lower dielectric constant. Thus, it is also clear that because the pre-expanded beads are obtained by substantially uniformly cutting the resin mixture and pre-expanding the cut resin mixture by adding a foaming agent as recited by claims 1 and 6, small beads have a high dielectric constant due to a low pre-expansion ratio and large beads have a low dielectric constant due to a high pre-expansion ratio. Therefore, it is clear that small beads are formed for use in the inner layer and large beads are formed for use in the outer layer.

Turning to the cited references, in Peters, particles of various sizes are formed **without preliminary expansion** and larger particles are employed for the inner layer of the lens and

smaller particles are employed for the outer layer of the lens (see, column 4, line 72 to column 5, line 1 of Peters). Since preliminary expansion is not conducted, their dielectric constants would be the same regardless of the size in Peters. Peters describes that “to obtain improved uniformity, ... the particles may be sieved after expansion” (see, column 5, lines 23-25 of Peters), but this process is performed especially for improving the uniformity in the shells of lower density. The reason is that performing the main expansion just once on unfoamed small particles does not result in large particles with a highly uniform dielectric constant because the difference in expansion ratios between individual particles is significantly large.

In this regard, preliminary expansion is generally conducted on unfoamed small particles to form middle-sized particles. The particles are sieved to remove smaller and larger particles and select the particles of the same size, and the selected particles are subjected to main expansion to form larger particles with improved uniformity. In Peters, the pre-expanded particles that have been sieved out are not used in forming the lens.

In contrast, according to present disclosure, the resin mixture is substantially uniformly cut, pre-expanded, and sieved so that small particles are used for forming the inner layer and large particles are used for forming the outer layer of the lens.

Further, with respect to the resin mixture before foaming, particles of various sizes are formed in Peters, while particles of uniform size (i.e., uniformly cut) are formed in the present disclosure.

Accordingly, Peters uses large particles for the inner layer and small particles for the outer layer while the claimed subject matter uses *small particles for the inner layer and large particles for the outer layer*.

It is also noted that, in Peters, the dielectric constant differs between the inner layer and the outer layer mainly because the expansion ratios in the main expansion are different, while in the present disclosure, the dielectric constant differs between the inner layer and the outer layer because the expansion ratios in the *preliminary* expansion are different.

Applicants submit that Anderlind does not cure the deficiency of Peters, and that it would not have been obvious to add the above identified features of claims 1 or 6 to the combination of Peters and Anderlind. Further, Applicants submit that the essential feature of the technology disclosed in Peters is that particles of various sizes are formed. In contrast, Anderlind discloses particles of uniform size. Thus, combining Anderlind with Peters would impair the purpose of Peters. Accordingly, it would not have been obvious to combine Peters with Anderlind to arrive at the claimed subject matter.

Based on the foregoing, Applicants respectfully submit that claims 1 and 6 and all claims dependent thereon are patentable over the cited references. Thus, Applicants respectfully request that the Examiner withdraw the rejection of claims 1-3 and 6.

**CONCLUSION**

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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